

Optimization of image fusion in permanent prostate implantsR. Martínez Cobo¹, A. Otero Romero², M. Rodríguez Liñán²¹ Hospital Universitario Reina Sofía de Córdoba, Física y Protección Radiológica, Spain² Hospital Universitario Reina Sofía de Córdoba, Oncología Radioterápica, Spain

Introduction. In Permanent Prostate Implants (PPI) with radioactive seeds a post-plan is required after completion of the implant. To calculate the post-plan it is required to register two imaging studies and the automatic search for the position of the seeds. **Purpose.** To improve process efficiency in the post-plan after a PPI (exact location of the implanted seeds, reliability of the registration and decrease in time).

Material and method. Certain variables used in the planning system (PS) for image registration and automatic search of seeds were determined. The PS used was SPOT PRO v3.0 by Nucletron. The method employed to make image registration was point matching. Quantitative result shown by the Root Mean Square (RMS). Image registration was performed in ten patients by two Radiation Oncologists (RO). One of the RO performed the registration using both three and four points. Different threshold values were introduced in Hounsfield Units (HU) for seeds and bone with the maximum and minimum area of the image of a seed. The coincidence between the number of seeds implanted and those detected by the PS were analyzed.

Results. The average measure of intraclass correlation coefficient (ICC) using an ANOVA model two-way random with absolute agreement is 0.857 (95% CI: 0.427–0.965) to RMS of record measured by two Radiation Oncologists and 0.740 (95% CI: 0.000–0.938) to RMS of record measured using three and four points for matching.

Conclusion. The reliability of the image registration allows the use of only three points for matching. The result is independent of the doctor who performs it. The best results to automatically search for the seed by the PS were obtained with the values of 1000 HU to seed threshold, 150 HU to bone threshold, 0.5 mm² to minimum spot area and 50 mm² to maximum spot area.

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Outcome and toxicity using interstitial-MRI Utrecht applicator in cervical brachytherapyE. Cuervo¹, F. Celada¹, S. Roldán¹, O. Pons¹, A. Soler¹, T. García², R. Palomo², A. Tormo¹¹ Hospital Universitario La Fe, Oncología Radioterápica, Spain² Hospital Universitario La Fe, Servicio de Radiofísica, Spain

Introduction. GEC-ESTRO recommendations for IGRT in brachytherapy, the incorporation of MRI in the planning and new MRI-compatible applicators have improved our treatments. But, in big tumours, intrauterine applicators do not seem enough in order to reach a good coverage. Interstitial CT-MRI Utrecht (Nucletron®) applicator with plastic needles lets improve HR-CTV and IR-CTV coverage sparing organs at risk.

Objective. To review clinical outcomes, toxicity and dosimetry in patients with cervix tumours using interstitial CT-MRI Utrecht applicator.

Material and methods. Retrospective review of the records of 52 cervical cancer patients treated in our institution from February 10 to October 12. To be included in the study, the treatment had to fulfill the criteria: (1) include a previous treatment of at least 45 Gy of EBRT to the pelvis concomitant with cisplatin; (2) the BT boost consisted in insertion of a interstitial Utrecht applicator under spinal anesthesia and individualized MRI planning. Each treatment was composed of 2 applications (7 days apart), with 2 separated fractions of ~7Gy (in 24 h). Toxicity scores were defined by CTCAE v3.0.

Results. 41/52 patients have available data. In most of them 6 needles were inserted. The final average biologically equivalent doses (EQD2) were: D90 HR-CTV = 86.4 Gy; D90 IR-CTV = 66.3 Gy; 2 cm³ maximum dose for bladder was 74.4 Gy and 63.4 Gy and 58.2 Gy respectively for rectum and sigmoid. 4 patients presented haemorrhage when application was removed. Median follow-up was 19 months (3–35). GU and GI G ≥ 3 toxicities occurred in 2 (4.8%) and 1 (2.4%) patients respectively. 6 (14.6%) patients developed systemic failure, but only 3 (7.3%) patients experienced local relapse, associated with large tumours with poor response to EBRT. Cancer specific survival was 92.6%.

Conclusions. Our results suggest that interstitial IGBT as recommended by the GEC-ESTRO, is safe, in terms of local control and morbidity. These clinical and dosimetric results compare favourably with the traditional technique.

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Perioperative interstitial high-dose-rate brachytherapy in tongue carcinoma

L. Corrales, V. Carrizo, J. Guinot, M. Tortajada, M. Santos, A. Mut, L. Arribas

Instituto Valenciano de Oncología, Oncología Radioterápica, Spain



Abstract purpose. To evaluate the results of perioperative interstitial high-rate-dose brachytherapy (PIHB) in patients with tongue carcinoma.

Materials and methods. Between June 2003 and January 2013, 34 patients with tongue carcinoma were treated with partial glossectomy and PIHB. In 21 cervical lymph node dissection was performed as well. Median age was 62 (24–93). Eleven patients were stage pT1, nineteen pT2 and four pT3, with lymph node involvement in 12 of them. EBRT 50–60 Gy was administrated to 40% of the patients, and 4 received chemotherapy. The brachytherapy technique used plastic tubes, implanted in the surgical bed just

after the tumor removal, starting irradiation after 3–5 days and keeping the tubes 10–12 days. Dose was 3–4 Gy per fraction, twice a day, 10 sessions if free surgical margin and 11 if affected. If the final pathology showed positive nodes, fewer sessions were administrated (5–6) and EBRT was added.

Results. Median follow-up was 28 months (1–115). There was local recurrence in 6 cases, with actuarial local control of 83% at 2 years (90% in pT1, 81.9% in pT2 and 66.3% in pT3). There were 6 cases of regional recurrence and distant metastasis in 3 cases. Nine patients died, only 4 due to disease progression. The disease-free survival at 2 years was 73.6%, and cause-specific survival was 89.4%. Acute complications were: one bleeding when removing the implant that required blood transfusion, lingual ulcer in 7 patients and severe mucositis in 2. Chronic complications were: 3 osteonecrosis and chronic lingual pain in 1 patient.

Conclusion. PIHB in carcinoma of the tongue is a technique with good local control and disease-free survival, with few acceptable complications. It allows less aggressive surgery with better tongue functionality, greater accuracy when placing the implant, higher doses with better dose distribution and earlier irradiation, avoiding surgical acts.

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Permanent-seed-brachytherapy in prostate cancer: The Catalan-institute-of-oncology experience

A. Daidone¹, C. Gutierrez², E. Martinez³, J. Pera³, F. Pino⁴, C. Gullon⁴, M. Castells⁵, M. Núñez³, A. del Carpio³, A. Boladeras², F. Ferrer³



¹ Policlínico di Palermo, Radiation Oncology, Spain

² Institut Català D'oncologia, Spain

³ Institut Català D'oncologia, Radiation Oncology, Spain

⁴ Institut Català D'oncologia, Physics Department, Spain

⁵ Hospital de Bellvitge, Urology, Spain

Purpose. To evaluate the outcomes of patient (Pts) with low-risk-prostate-cancer treated with seeds monotherapy.

Material and methods. We reviewed retrospectively 700 pts who had undergone transperineal-ultrasound-guided-implantation with I-125-seeds as monotherapy between January 2000 and December 2012. All pts received 144/145 Gy. The implant dose was defined as the dose delivered to 95% of the prostate volume. D90 was between 100% and 150%. The median f-up was 63 months (range 6–164). 11 pts were lost. Median age was 64.8 years (range 35–79). We have considered separately the local relapse as biopsy-proved-tumor after seed implantation, or evidence of metastases, and elevation of the prostate-specific antigen level beyond the nadir value plus 2 ng/mL as biochemical failure.

Results. The Gleason-score (G) was less than 7 in 684 pts (97.7%), G7 13 pts (1.9%), and G8 3 pts. 0.4%. The initial prostate-specific-antigen (PSA) level was lower than 10 ng/mL in 664 pts (94.4%), 10.1–20 in 32 pts (4.6%). The disease stage was up to T2a in 685 pts 97.8%; T2b–T2c in 15 (2.2%). 85 pts (12.1%) received hormonal ablation. Overall survival was 94% (CI 92–96) and 84% (CI 78–90) at 5 and 10-year. The cause specific survival was 100% and 97% (CI 95–99) at 5 and 10 year. The disease free survival was 95% (CI 93–97) and 86% (CI 80–92) at the 5 and 10 year. The 5 and 10-year biochemical disease-free were 95% (CI 93–97) and 85% (CI 79–91) respectively. The GII and GIII rectal acute toxicity were 2.3% (n = 16) and 1.4% (n = 10). The GII and GIII genitourinary acute toxicity were 22.6% and 6.9%: 59 pts needed urinary catheter (8.4%), 30 pts needed urinary cystostomy (4.3%) and 17 pts needed TUR (2.4%). The GII and GIII rectal late toxicity were 1% (n = 7) and 1.5% (n = 11), the GII and GIII genitourinary late toxicity were 6.2% (n = 44) and 3.2% (n = 23). Only 3 pts died for progression and 1 for toxicity.

Conclusion. Our results in prostate permanent seeds are similar to the expected ones in terms of efficacy and secondary acute and chronic side-effects.

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Plaque brachytherapy for choroidal melanoma: A 6-year experience

I. Rodríguez Rodríguez¹, M. Asencio Duran², A. Escribano Uzcudum³, E. Corredoira⁴, C. Huerga⁴, A. Mañas Rueda³



¹ Hospital Universitario La Paz, Spain

² Hospital Universitario La Paz, Oftalmología, Spain

³ Hospital Universitario La Paz, Oncología Radioterápica, Spain

⁴ Hospital Universitario La Paz, Radiofísica, Spain

Purpose/objective. The main advantages of episcleral plaque brachytherapy in choroidal melanoma, compared to enucleation, are the possibility of preserving vision and secondly organ preservation. Local control is relevant and it is associated with prolonged survival. The objectives are: to evaluate tumor local control (LC), the safety of the procedure and to report treatment-related complications.

Materials and methods. 100 consecutive patients with choroidal melanoma (59 females and 41 males) underwent treatment with Iodine-125 (125I) or ruthenium-106 (106Ru) since July 2006. The mean age was 56.5 years. According to the COMS classification, 19 small tumors, 64 medium and 17 were large ones. 65.55% of cases were localized in the temporal quadrants. The diagnosis was based on the results of ophthalmoscopic and ultrasonographic examination, and all patients underwent metastatic workup. For dosimetric purposes, a virtual simulator of the eyeball was used for extrapolation of ultrasound and funduscopy imaging